SOUTH DAKOTA STATEWIDE FISHERIES SURVEY

2102-F-21-R-40

Name: Marindahl **County**: Yankton
Legal Description: T95N-R54W-Sec. 7, 17, 18, 20
Location from nearest town: 4 miles west and 3 miles south of Irene, SD.

Dates of present survey: June 11, 2007 (electrofishing); August 13-15, 2007 (netting)
Dates of last survey: June 10, 2003 (electrofishing); August 18-20, 2003 (netting)

Primary Game Species	Other Species
Largemouth Bass	Channel Catfish
Bluegill	Black Bullhead
Black Crappie	Common Carp
	White Sucker
	Green Sunfish

PHYSICAL DATA

Surface area: 139 acres (56.3 ha) **Watershed area**: 42,889 acres (17,370 ha)
Maximum depth: 30 feet (9.4 m) **Mean depth**: 13 feet (4 m)
Volume: 1746.5 acre feet **Shoreline length**: 3.8 miles
Contour map available: Yes **Date mapped**: 1985
Lake elevation observed during the survey: Full
Beneficial use classifications: (4) Warmwater permanent fish propagation, (7) immersion recreation, (8) limited-contact recreation, and (9) fish and wildlife propagation and stock watering.

Introduction

Marindahl Lake is an artificial impoundment created when the South Dakota Department of Game, Fish and Parks (GFP) constructed an earthen dam across Clay Creek in 1952. After years of poor fishing due to overabundant carp and bullhead populations, the lake was chemically renovated in 1988.

Ownership of Lake and Adjacent Lakeshore Properties

Marindahl Lake and the surrounding shoreline is owned and managed by the South Dakota Department of Game, Fish and Parks (GFP).

Fishing Access

The Marindahl Lake Access Area is located on the southwest corner of the lake near the dam and contains a single lane boat ramp with a dock, public toilet and many shore fishing areas. There are many other shore fishing areas around the entire lake.

Field Observations of Water Quality and Aquatic Vegetation

The water in Marindahl during the survey was stained brown with Secchi depth measurement of 2 m (79 in.). Sparse stands of sago pondweed (*Potamogeton pectinatus*) were observed. Various sedges (*Carex spp.*) were found along the shoreline and cattail (*Typha spp.*) was common in the north end of the lake.

BIOLOGICAL DATA

Methods:

Marindahl Lake was sampled on August 13-15, 2007 with nine overnight trap net sets. The trap nets are constructed with 19-mm-bar-mesh (3/4 in) netting, 0.9 m high x 1.5 m wide (3 ft high x 5 ft wide) frames and 18.3 m (60 ft) long leads. Two hours of nighttime electrofishing was done on June 11, 2007 to evaluate the largemouth bass population. Trap net and electrofishing sites are displayed in Figure 4.

Results and Discussion:

Trap Net Catch

Black crappies, bluegills, and white suckers comprised 93.8% of the trap net sample this year (Table 1). Channel catfish, common carp, green sunfish, and black bullhead were also sampled.

Table 1. Total catch from nine overnight trap net sets at Marindahl Lake, Yankton County, August 13-15, 2007.

Species	Number	Percent	CPUE[1]	80% C.I.	Mean CPUE*	PSD	RSD-P	Mean Wr
Black Crappie	317	38.0	35.2	±22.5	45.3	11	0	101
Bluegill	237	28.4	26.3	±8.3	44.7	74	0	94
White Sucker	229	27.4	25.4	±10.6	7.1	99	97	78
Channel Catfish	35	4.2	3.9	±2.2	6.4	22	4	81
Common Carp	12	1.4	1.3	±1.1	0.3	--	--	--
Green Sunfish	4	0.5	0.4	±0.4	0.0	--	--	--
Black Bullhead	1	0.1	0.1	±0.1	0.8	--	--	--

* 5 years (1997, 1999, 2001, 2003, 2005)

[1] See Appendix A for definitions of CPUE, PSD, and mean Wr.

Bluegill

Management objective: Maintain a bluegill fishery with a trap net CPUE of at least 20 and RSD-18 of at least 20.

Since 2003, bluegill trap-net CPUE has decreased while PSD and RSD-18 have increased (Table 2). Growth is about average through age-3 but then it slows considerably and older fish experience high mortality (Table 3). Length for each age class is unchanged for age-1 to age-3 fish since 2003. An RSD-18 that is commonly less than10 indicates few fish ever exceed 18 cm (7 in) in length. The average length of sampled bluegills has ranged from 14-16 cm (5.5- 6.3 in) since 1997. The Marindahl bluegill population is maintained entirely by natural reproduction (Table 9).

Table 2. Bluegill trap-net CPUE, PSD, RSD-18, RSD-P, and mean Wr for Marindahl Lake, Yankton County, 1998-2007.

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	Mean*
CPUE		47.3		56.9		63.4		45.0		26.3	44.7
PSD		47		84		53		57		74	63
RSD-18		10		6		0		0		4	7
RSD-P		1		0		0		0		0	0
Mean Wr		110		110		92		89		94	99

*5 years (1997, 1999, 2001, 2003, 2005)

Table 3. Average back-calculated lengths (mm) for each age class of bluegill in Marindahl Lake, Yankton County, 2007.

			Back-calculation Age							
Year Class	Age	N	1	2	3	4	5	6	7	8
2006	1	28	48							
2005	2	44	59	116						
2004	3	86	57	117	149					
2003	4	67	57	115	146	160				
2002	5	5	60	120	148	167	178			
2001	6	9	40	94	127	145	160	171		
All Classes		**239**	**56**	**115**	**147**	**158**	**166**	**171**		
Statewide Mean			55	103	141	166				
Region III Mean			60	116	157	180				
SLI* Mean			53	101	138	163				

* Small Lakes and Impoundments

Black Crappie

Management objective: Maintain a black crappie fishery with a trap net CPUE of at least 20 and PSD of at least 40.

Marindahl Lake has always contained a lot of black crappies but they never grow very large. In 2006 11,862 adult crappies were removed from the lake and stocked into other waters. This was done to determine if decreased abundance would result in increased growth for the remaining fish. Trap-net CPUE declined by over half in 2007 suggesting the removal effort had an effect on density (Tables 4 and 5). The removal data was used to calculate a depletion-based population estimate using a Leslie regression model and the initial population was estimated at 14,650 fish (80% C. I.: 13,012-16,288). This model suggested that the removal harvested about 80% of the sub-adult and adult (age 2+) black crappies from the lake. The 2007 trap-net CPUE of age 3+ black crappies just over 13 which represents nearly an 81% decline from the 2005 CPUE of 62.3 suggesting that our population estimate was reasonable.

While CPUE exceeds our management objective, PSD does not, indicating a population comprised of smaller fish. Growth of black crappies from the large 2005 year class is slightly above growth from past year classes possibly reflecting reduced competition with the removal (Table 5). However, growth of older crappies has not improved substantially when compared with growth of similar aged fish in 2005. We would hope to see faster growth of age-3+ fish over the next two years given the high percentage of black crappies taken during the removal.

The length-frequency histograms in Figure 2 show that natural recruitment is fairly consistent. Like bluegills, the black crappie population is maintained solely by natural reproduction.

Table 4. Black crappie trap-net CPUE, PSD, RSD-P, and mean Wr for Marindahl Lake, Yankton County, 1998-2007.

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	Mean*
CPUE		37.5		38.5		19.4		62.3		35.2	45.3
PSD		58		31		32		10		11	36
RSD-P		4		1		1		1		0	1
Mean Wr		112		117		100		97		101	105

*5 years (1997, 1999, 2001, 2003, 2005)

Table 5. Average back-calculated lengths (mm) for each age class of black crappie in Marindahl Lake, Yankton County, 2007.

			Back-calculation Age							
Year Class	Age	N	1	2	3	4	5	6	7	8
2006	1	6	80							
2005	2	190	86	150						
2004	3	50	67	142	168					
2003	4	59	75	138	170	185				
2002	5	9	83	145	183	203	217			
All Classes		**314**	**78**	**144**	**174**	**194**	**217**			
Statewide Mean			83	147	195	229	249			
Region III Mean			95	167	219	253	274			
SLI* Mean			78	134	180	209	226			

Largemouth Bass

Management objective: Maintain a largemouth bass fishery with an electrofishing CPH of at least 20 and RSD-P range of 20-40.

Largemouth bass electrofishing catch per hour (CPH) decreased to 14.0 in 2007 (Table 6). All but three bass sampled were at least stock length (20 cm, 8 in). Of the 28 bass sampled, 2 (7%) and 5 (18%) were stocked as juveniles or adults in 2004 and 2006, respectively. Growth (Table 7) was slow, but this was heavily influenced by the extremely slow growth of the recently stocked, stunted adults obtained from West River stock dams. Growth of resident age-1 and age-2 largemouth bass is slightly above average for small lakes and impoundments. The length-frequency histograms in Figure 3 show a population ranging in length from 120-530 mm (4.7-21.0 in). Based on ages assigned using scales, nine year classes from age-1 to age-11 were represented in the sample (Table 7).

Table 6. Largemouth bass electrofishing CPH, PSD, RSD-P, and mean Wr for Marindahl Lake, Yankton County, 1998-2007.

	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	Mean*
CPUE				15.5		41.0		19.0		14.0	25.2
PSD				71		46		65		92	61
RSD-P				52		29		22		64	34
Mean Wr				92		100		101		99	98

*3 years (2001,2003, 2005)

Table 7. Average back-calculated lengths (mm) for each age class of largemouth bass in Marindahl Lake, Yankton County, 2007.

			Back-calculation Age							
Year Class	Age	N	1	2	3	4	5	6	7	8
2006	1	3	106							
2005	2	3	119	247						
2003	4	5	107	204	278	352				
2002	5	7	101	184	264	347	385			
2001	6	4	111	229	287	335	385	412		
2000	7	2	125	223	269	319	364	394	414	
1999	8	1	95	159	224	272	326	352	373	389
1998	9	2	83	168	239	298	326	358	401	421
1996	11	1	92	197	327	368	434	472	492	515
All Classes		**28**	**104**	**201**	**270**	**327**	**370**	**398**	**420**	**442**
Statewide Mean			96	182	250	305	342			
Region III Mean			111	212	287	347	383			
SLI* Mean			99	183	246	299	332			

All Fish Species

White sucker trap-net CPUE has increased substantially from previous surveys while black bullhead and common carp densities remain low (Table 8). Channel catfish CPUE has decreased from the peak of 17.9 in 2003.

Table 8. Trap-net CPUE for all fish species sampled in Marindahl Lake, Yankton County, 1997-2007.

Species	1997	1999	2000	2001	2002	2003	2004	2005	2007
GOE	--	--		--		--		0.1	--
COC	0.2	0.5		--		0.3		0.5	1.3
WHS	0.0	0.3		5.1		7.4		22.7	25.4
CCF	0.7	0.8		0.7		17.9		12.1	3.9
BLB	2.7	1.0		--		--		0.5	0.1
LMB	--	--		--		--		0.1	--
BLC	68.7	37.5		38.5		19.4		62.3	35.2
GSF	--	--		--		0.1		0.1	0.4
BLG	10.8	47.3		56.9		63.4		45.0	26.3
HYB	--	--		--		--		0.2	--
YEP	--	--		--		0.1		0.3	--
WAE	1.5	0.4		--		--		--	--

GOE (Goldeye), COC (Common Carp), WHS (White Sucker), CCF (Channel Catfish), BLB (Black Bullhead), LMB (Largemouth Bass), BLC (Black Crappie), GSF (Green Sunfish), BLG (Bluegill), HYB (Hybrid Sunfish), YEP (Yellow Perch), WAE (Walleye)

MANAGEMENT RECOMMENDATIONS

1. Continue to survey the fish community with trap nets and electrofishing every other year with the next one occurring in 2009.

2. It appears that recruitment of channel catfish in Marindahl is poor possibly due to predation by largemouth bass. Consider additional adult stockings if the population declines.

3. Unless natural recruitment increases, maintain bass CPH at current levels by continuing the adult stocking program. PIT tag stocked bass to evaluate their survival and overall contribution to the population, and track growth of individuals.

4. Consider periodic drawdowns to improve aquatic habitat abundance and quality.

5. If improved growth of black crappies or bluegills is observed after the 2006 removal, continue to reduce panfish abundance by intensive netting to maintain good growth and improve the size structure.

Table 9. Stocking record for Marindahl Lake, Yankton County, 1991-2007.

Year	Number	Species	Size
1991	7,000	Largemouth Bass	Med. Fingerling
1992	27,000	Channel Catfish	Fingerling
	13,500	Largemouth Bass	Med. Fingerling
1993	136,940	Rainbow Trout	Fingerling
	27,000	Walleye	Sml. Fingerling
1994	6,720	Channel Catfish	Fingerling
	4,050	Walleye	Sml. Fingerling
1996	3,375	Walleye	Lrg. Fingerling
1997	13,500	Largemouth Bass	Fingerling
1998	13,500	Largemouth Bass	Fingerling
1999	13,000	Largemouth Bass	Fingerling
2002	20,000	Channel Catfish	Fingerling
	139	Largemouth Bass	Adult
2003	281	Largemouth Bass	Adult
2004	200	Largemouth Bass	Juvenile
2006	320	Largemouth Bass	Adult

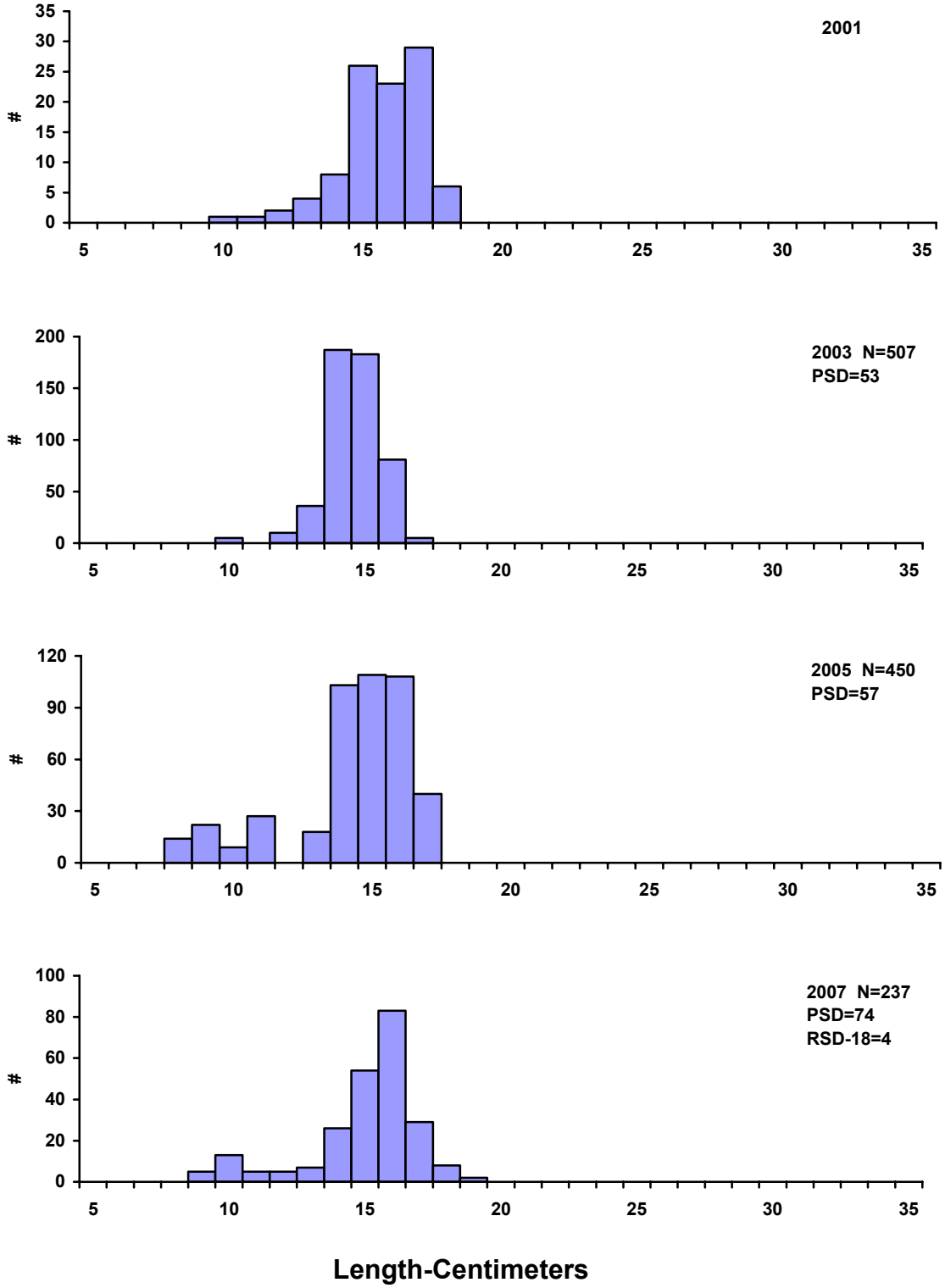

Figure 1. Length frequency histograms for bluegill sampled with trap nets in Marindahl Lake, Yankton County, 2001, 2003, 2005, and 2007.

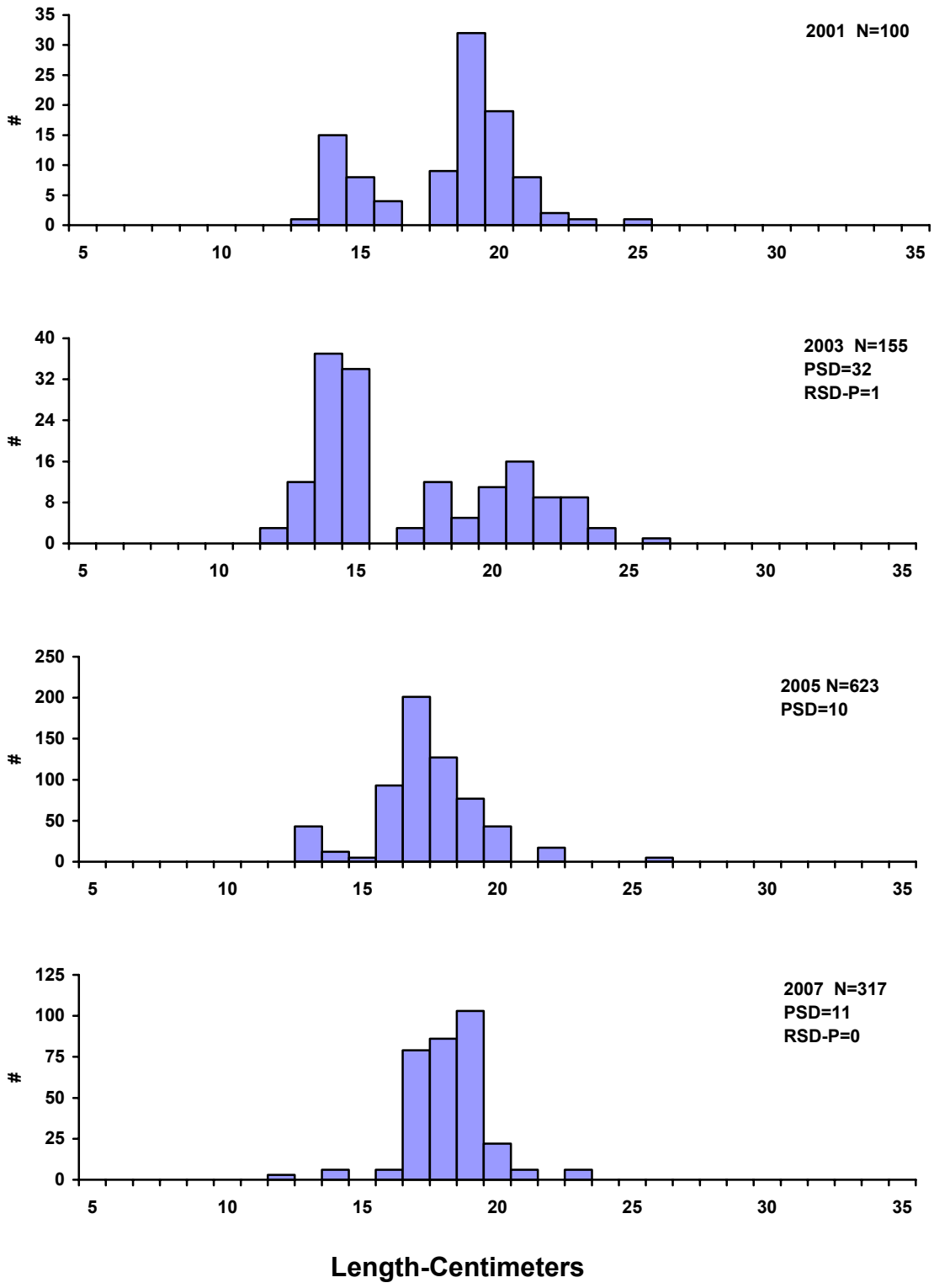

Figure 2. Length frequency histograms for black crappie sampled with trap nets in Marindahl Lake, Yankton County, 2001, 2003, 2005, and 2007.

\

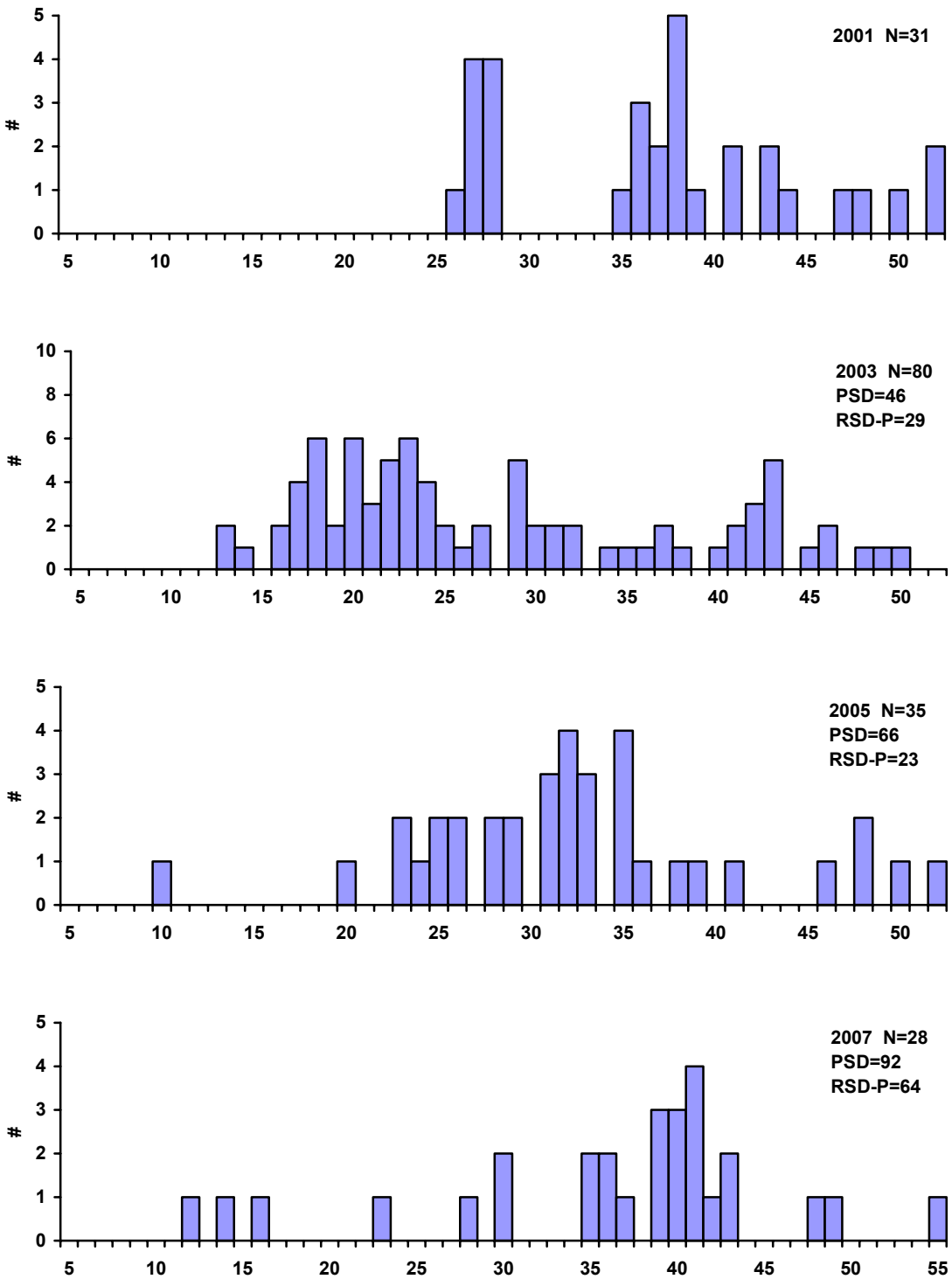

Figure 3. Length frequency histograms for largemouth bass sampled by electrofishing in Marindahl Lake, Yankton County, 2001, 2003, 2005, and 2007.

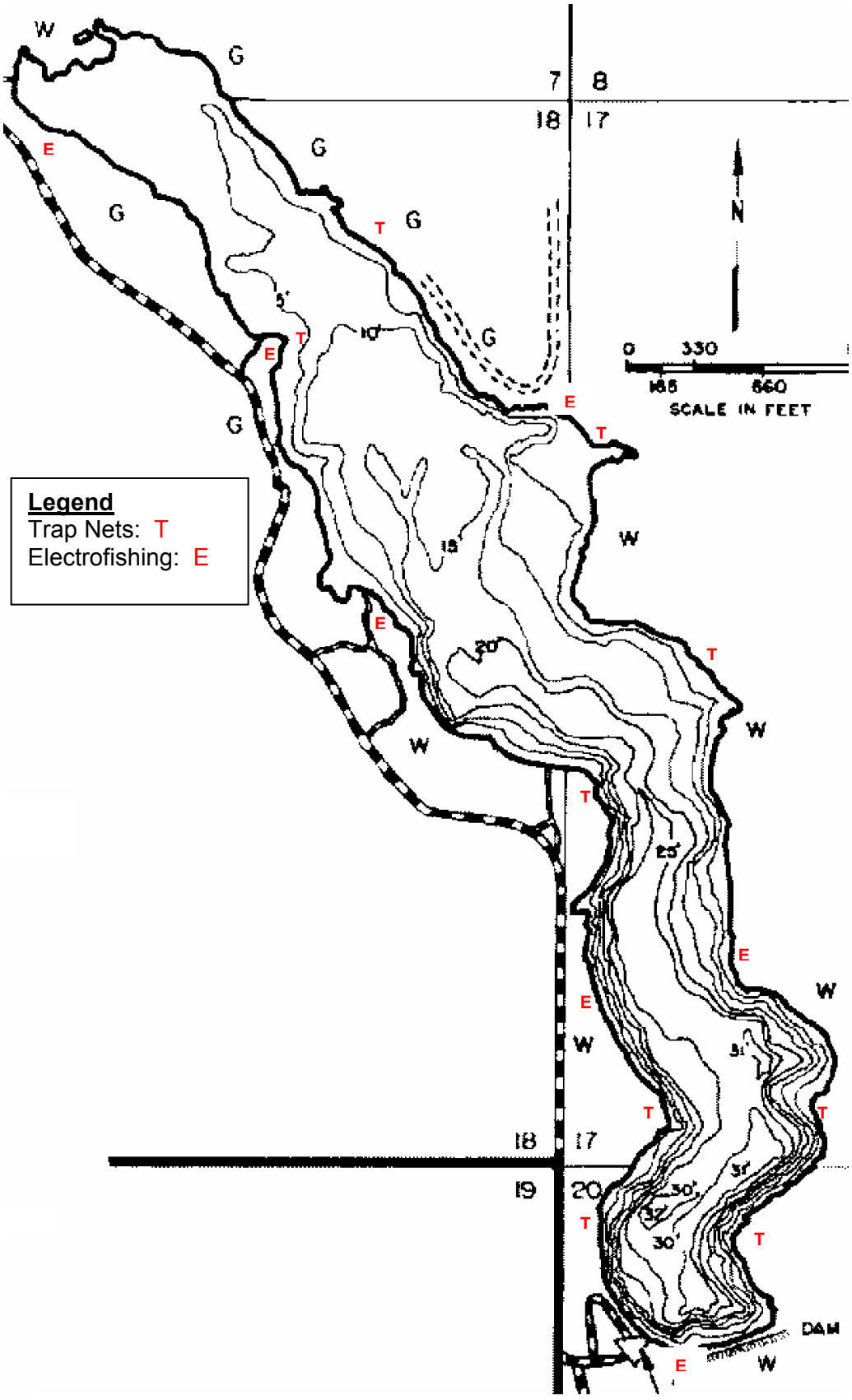

Figure 4. Sampling locations on Marindahl Lake, Yankon County, 2007.

Appendix A. A brief explanation of catch per unit effort (CPUE), proportional stock density (PSD), relative stock density (RSD) and relative weight (Wr).

Catch Per Unit Effort (CPUE) is the catch of animals in numbers or in weight taken by a defined period of effort. Can refer to trap-net nights of effort, gill-net nights of effort, catch per hour of electrofishing, etc.

Proportional Stock Density (PSD) is calculated by the following formula:

$$PSD = \frac{\text{Number of fish} > \text{quality length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

Relative Stock Density (RSD-P) is calculated by the following formula:

$$RSD\text{-}P = \frac{\text{Number of fish} > \text{preferred length}}{\text{Number of fish} \geq \text{stock length}} \times 100$$

PSD and RSD-P are unitless and usually calculated to the nearest whole digit.

Size categories for selected species found in Region 3 lake surveys, in centimeters.

Species	Stock	Quality	Preferred	Memorable	Trophy
Walleye	25	38	51	63	76
Sauger	20	30	38	51	63
Yellow perch	13	20	25	30	38
Black crappie	13	20	25	30	38
White crappie	13	20	25	30	38
Bluegill	8	15	20	25	30
Largemouth bass	20	30	38	51	63
Smallmouth bass	18	28	35	43	51
Northern pike	35	53	71	86	112
Channel catfish	28	41	61	71	91
Black bullhead	15	23	30	38	46
Common carp	28	41	53	66	84
Bigmouth buffalo	28	41	53	66	84
Smallmouth buffalo	28	41	53	66	84

For most fish, 30-60 or 40-70 are typical objective ranges for “balanced” populations. Values less than the objective range indicate a population dominated by small fish while values greater than the objective range indicate a population comprised mainly of large fish.

Relative weight (Wr) is a condition index that quantifies fish condition (i.e., how much does a fish weigh for its length). A Wr range of 90-100 is a typical objective for most fish species. When mean Wr values are well below 100 for a size group, problems may exist in food and feeding relationships. When mean Wr values are well above 100 for a size group, fish may not be making the best use of available prey.